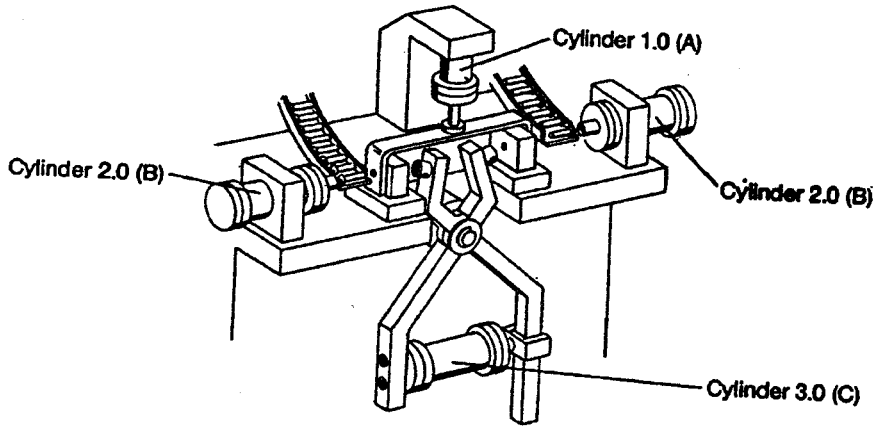
Example: Rivetting Machine

Rivetting of brackets

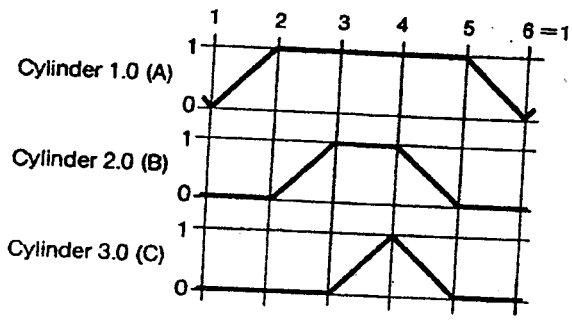
The parts are loaded by hand. Cylinder 1.0 (A) clamps. The two cylinders 2.0 (B) push the rivets in and hold them firmly.

Cylinder 3.0 (C) produces the 2nd half-round head. The completed parts can be removed by hand.

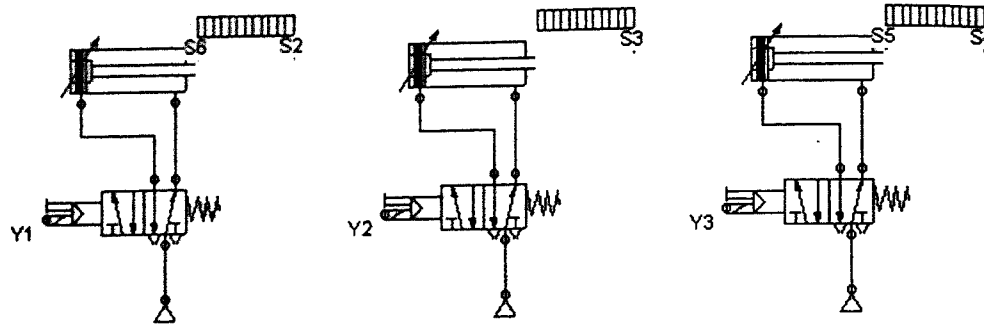
Layout drawing



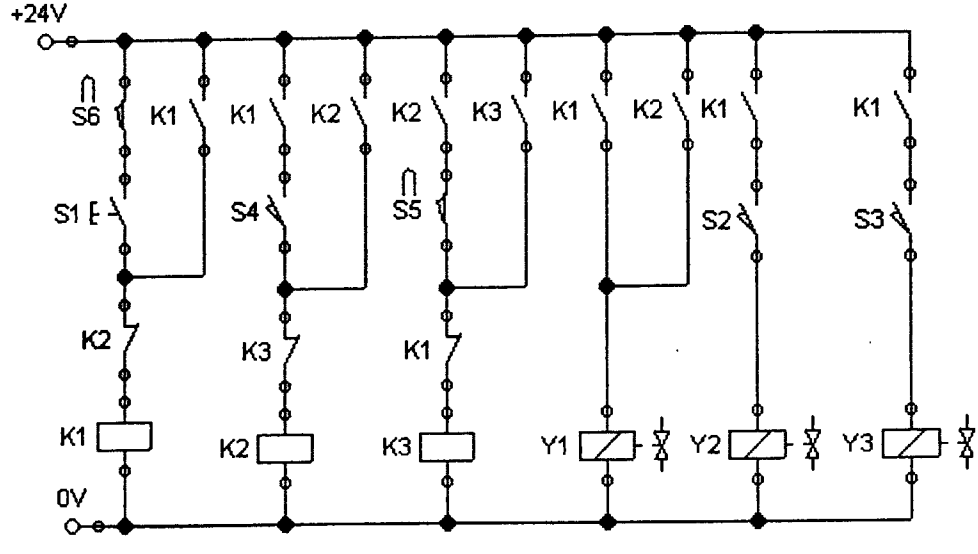
Displacement-step diagram



Power Circuit



Control circuit



Sequence chart

Working Step	Operation of sensor	By	Operation of stepping relay	Processing step by stepping relay	Operation of output solenoid	Working Element travels to		Comment
						Forward	Rearward	
1	s1	Hand	k1(on)/k3(off)	1	y1(on)	1		
2	s2	1		1	Y2(on)	2		
3	s3	2		1	y3(on)	3		
4	s4	3	k2(on)/k1(off)	2	y2(off)/y3(off)		3 and 2	
5	s5	3	k3(on)/k2(off)	3	y1(off)		1	

Chapter 8

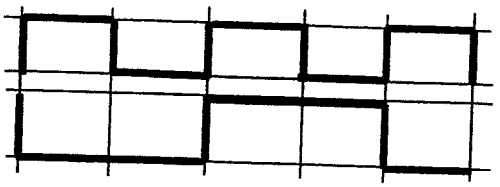
Construction circuit diagram using alternative method

Prepared by U Tint Zaw

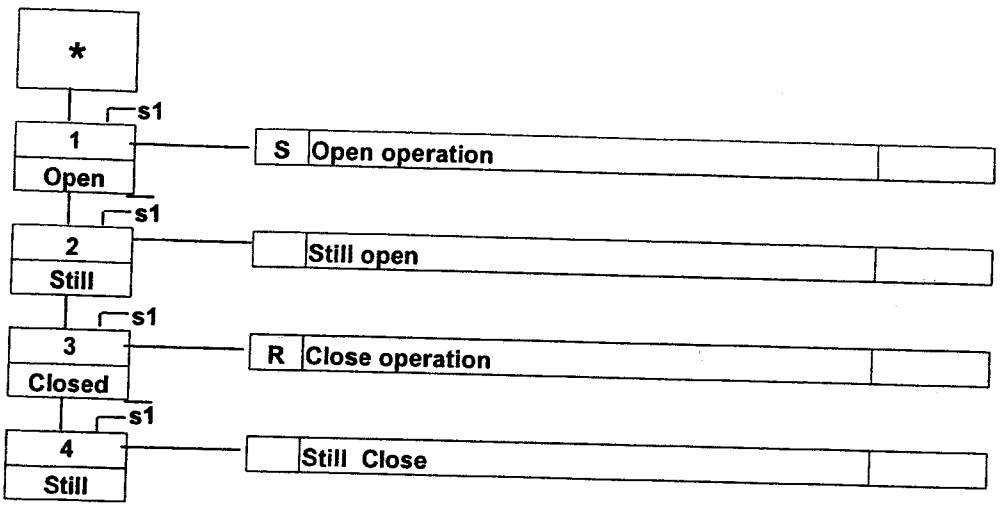
Alternating circuit

Input signal

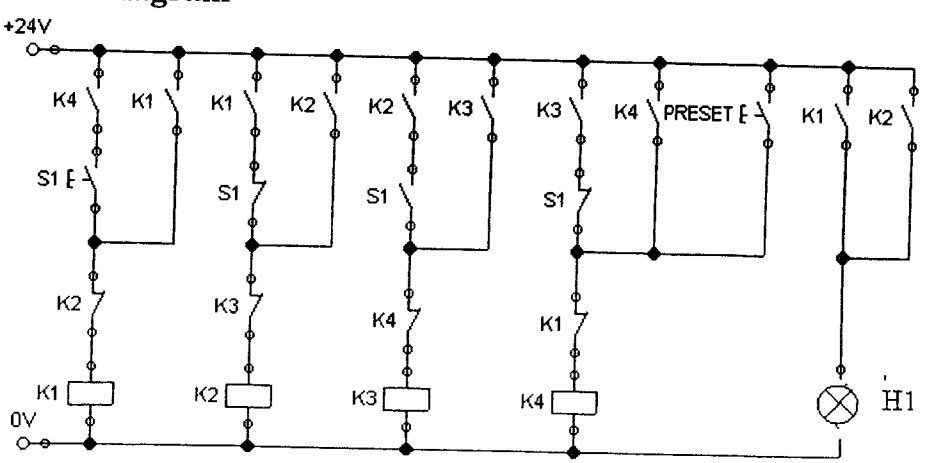
Output signal



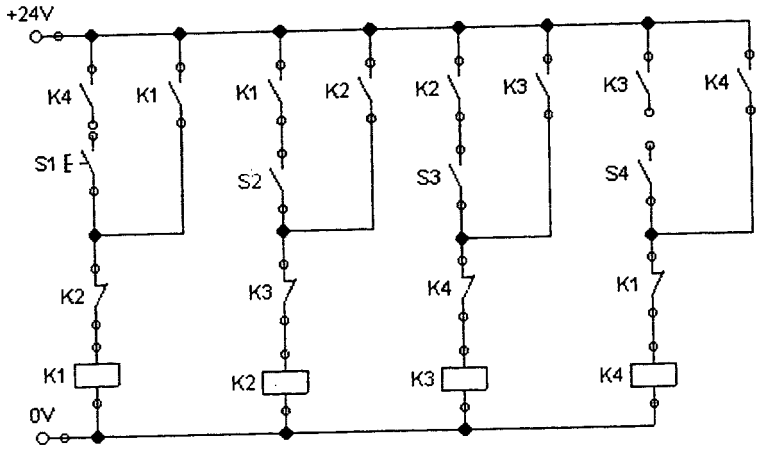
Function Chart



Circuit Diagram



Shift register circuit



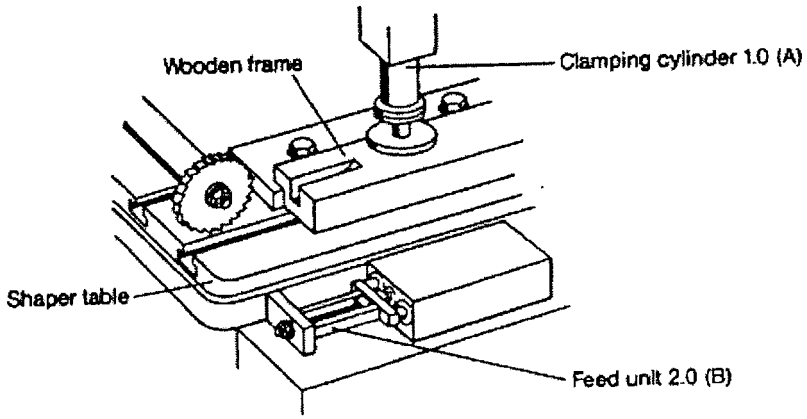
Example

Example : Hand Lever Shaper

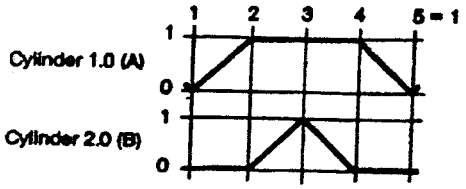
Groove cutting

Groves are to be cut in wooden frames on a shaper . The wooden frame is clamped with a pneumatic cylinder . The feed of the shaper table is performed by a pneumatic –hydraulic feed unit.

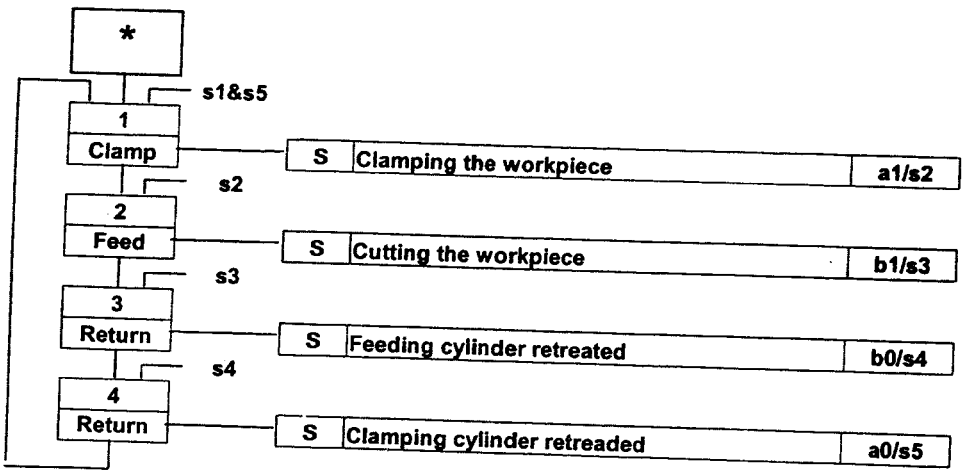
Layout drawing



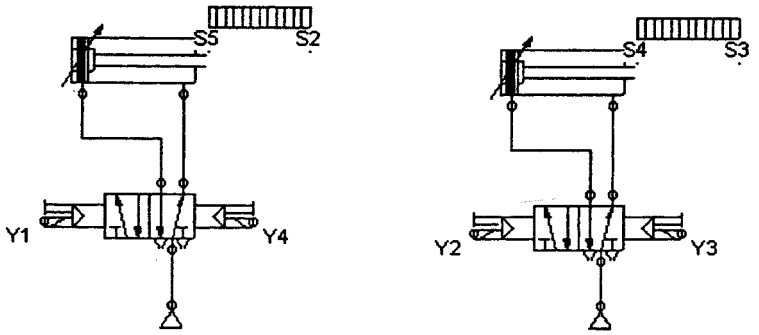
Displacement-step diagram



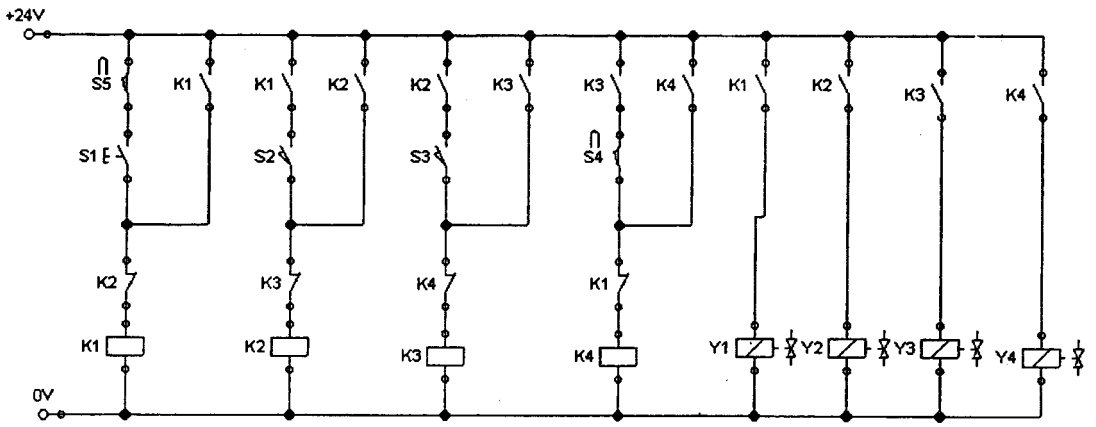
Function chart



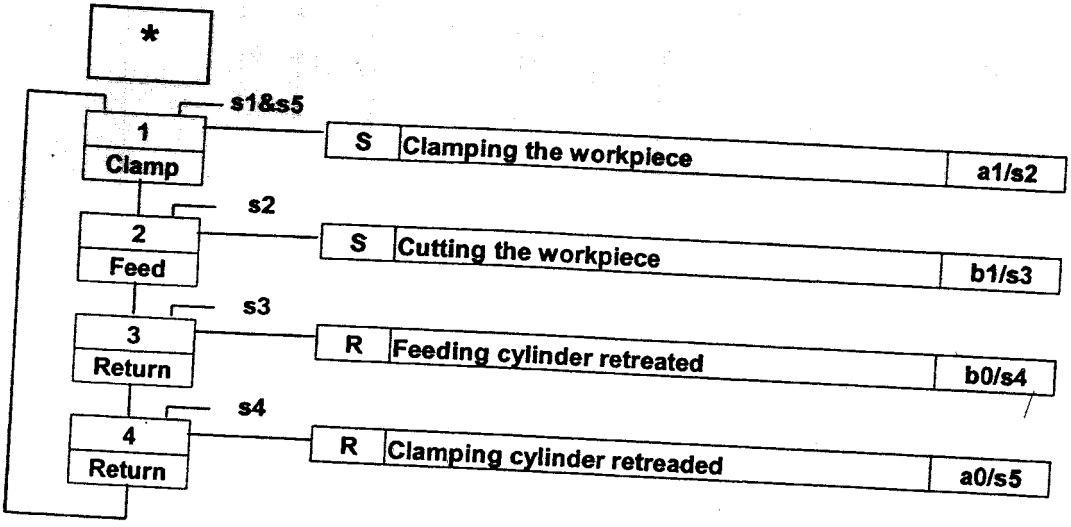
Power Circuit



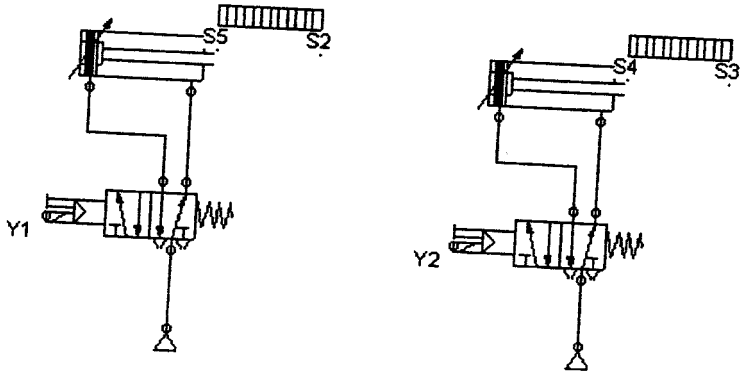
Control circuit



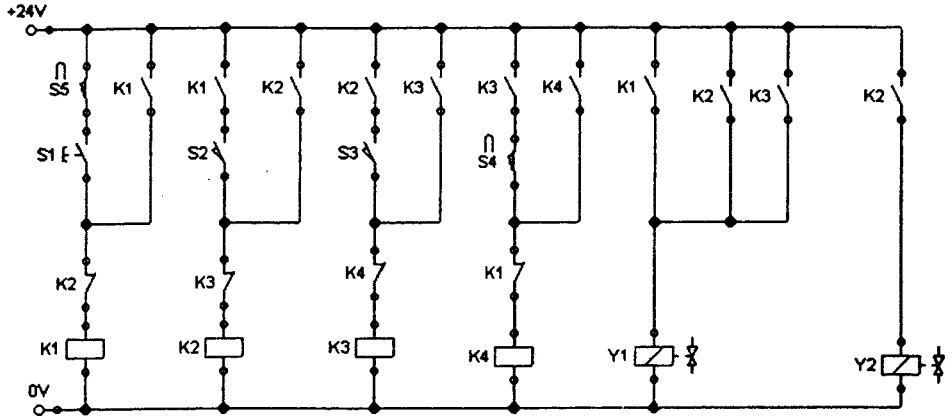
Function chart (Single solenoid)



Power ciruit



Control circuit



Example : Sheet metal strip feed unit

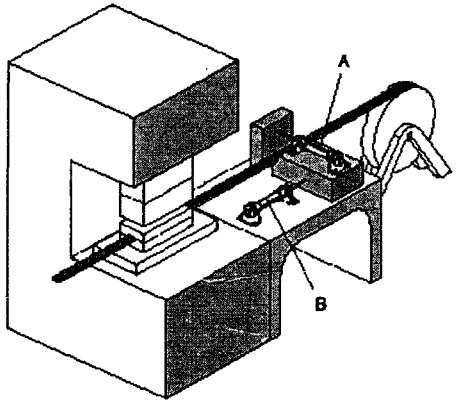
Problem description

A sheet metal strip is to be fed from a drum towards the cutting tool. The feed unit may only start when the punch-tool is in the upper position (this signal must be simulated by a push button S3). Cylinder A holds the sheet metal strip and cylinder B retracts. Cylinder A re-leases the strip and cylinder B returns to the forward end position.

Operating condition

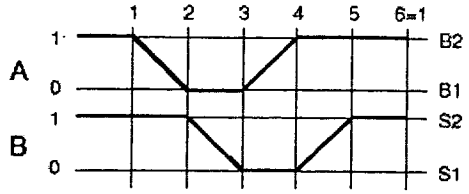
The sheet metal strip feed unit must be provided with a main switch S. When cylinder B has retracted and cylinder A has released the strip, a signal (optical indicator) is to be passed on to the press for the next part to be punched out.

Positional sketch

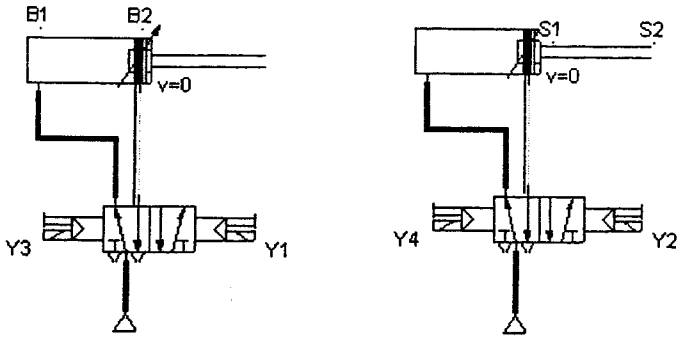


Displacement-step diagram

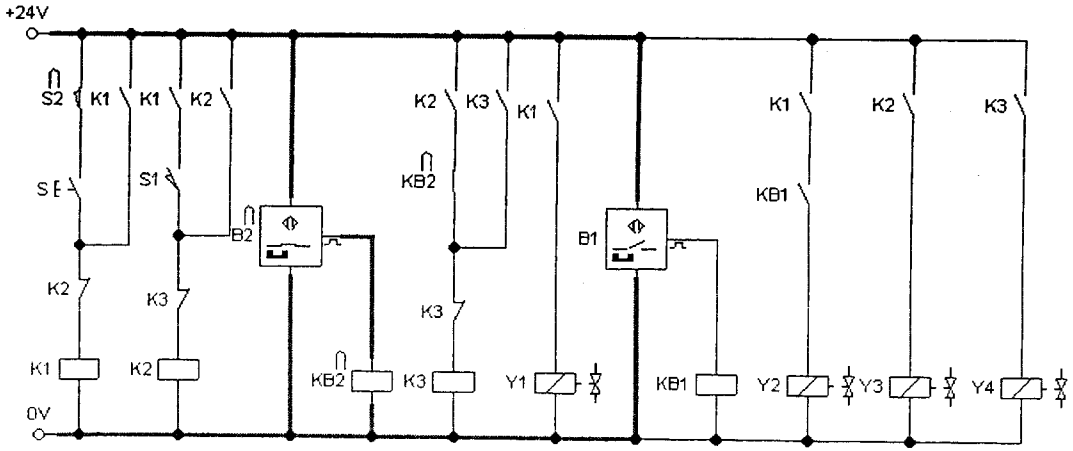
Displacement-step diagram



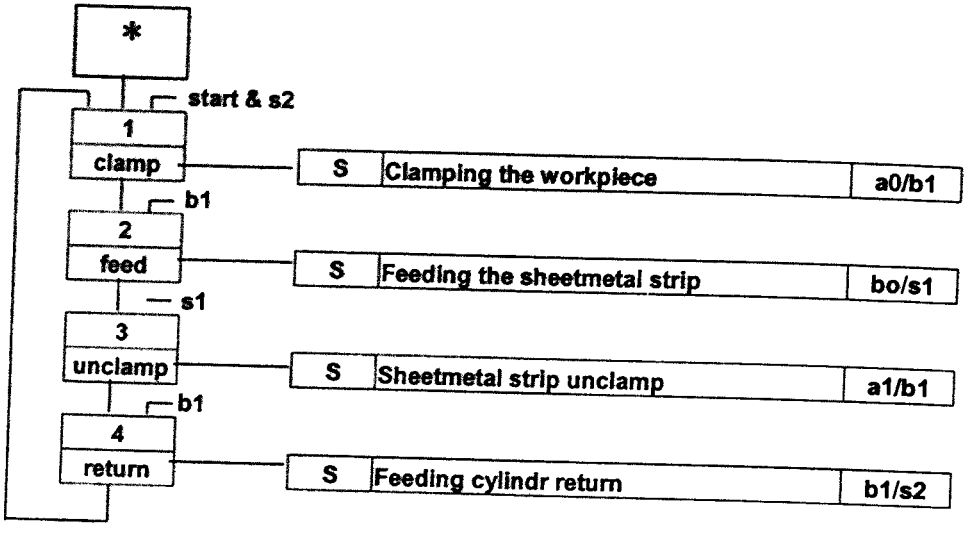
Circuit diagram, pneumatic



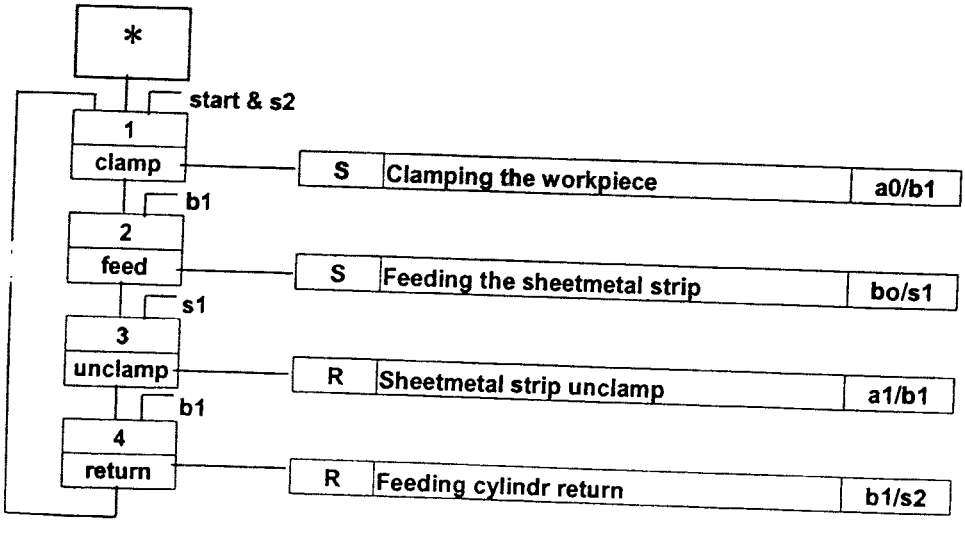
Control circuit



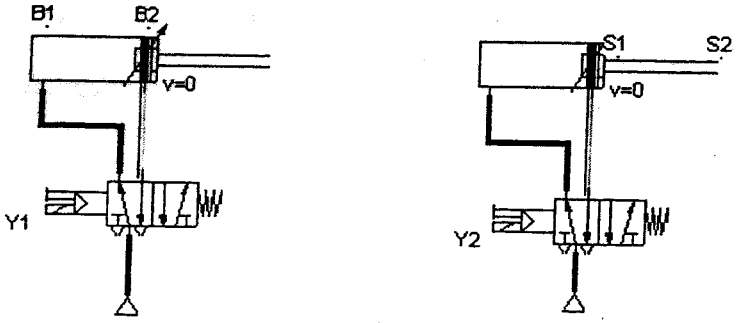
Function chart using double solenoid



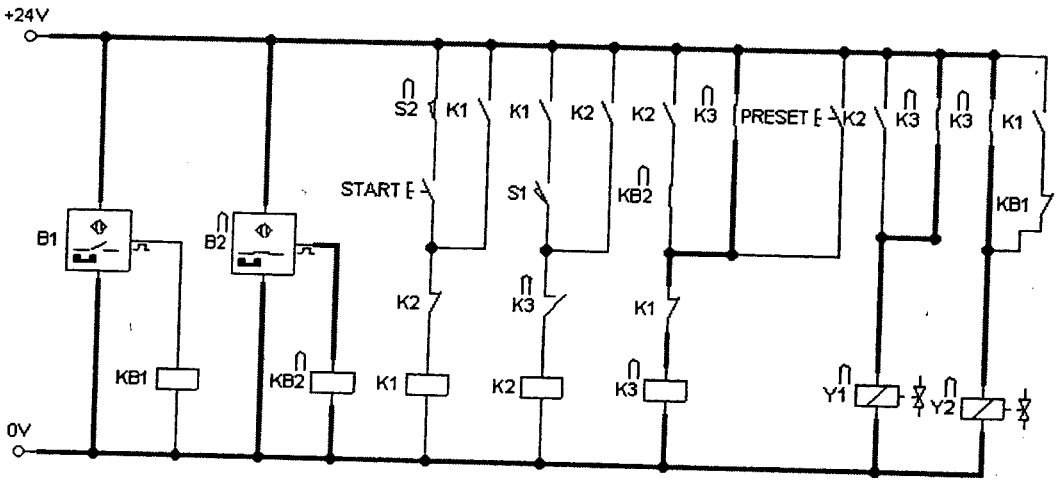
Function chart using single solenoid



Power circuit using single solenoid



Control circuit

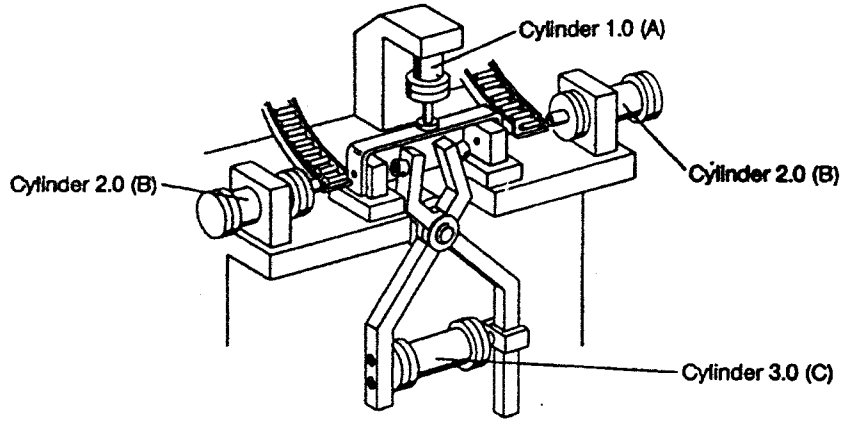


Example :Riveting Machine

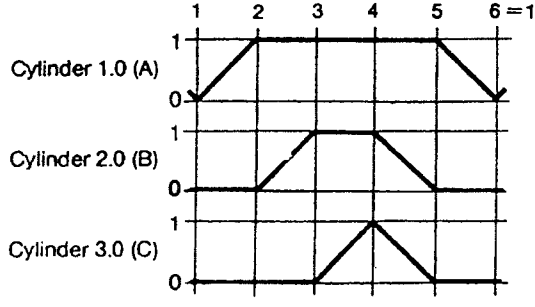
Riveting of bracking

The parts are loaded by hand . Cylinder 1.0 (A) clamps. The two cylinder 2.0 (B) push the rivets in and hold them firmly.
Cylinder 3.0 (C) produces the 2nd half-round. The completed parts can be removed by hand.

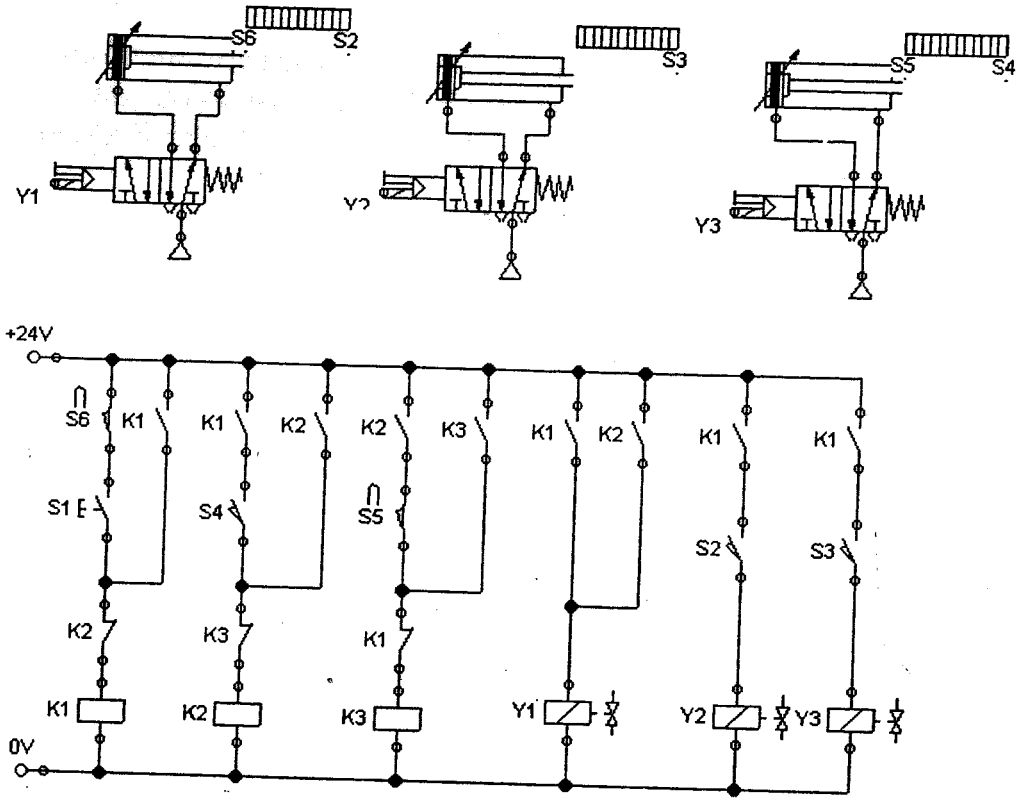
Layout drawing



Displacement –step diagram



Power circuit

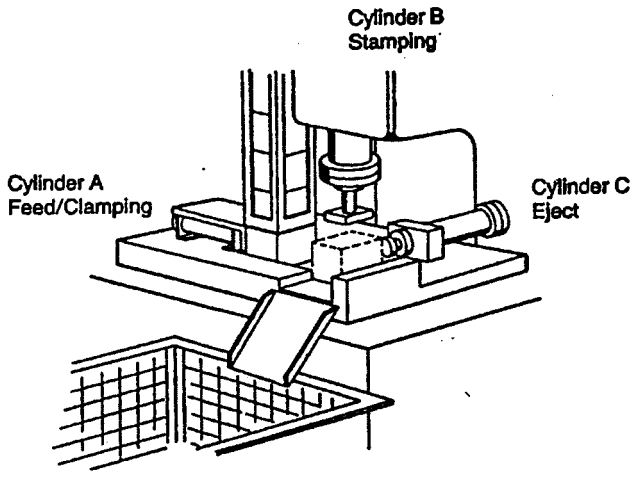


Example : Stamping appliance

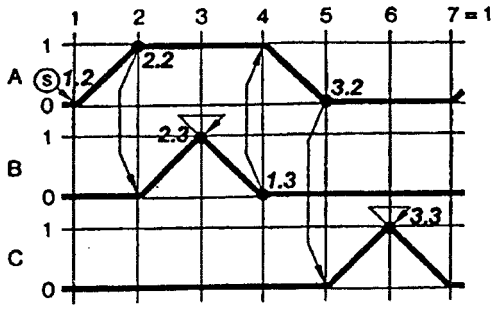
Problem

Rectangular part are stamped on a special machine. The parts are taken from a gravity-feed magazine , pushed into the machine against a stop and clamped by mean of a cylinder A, stamped by a second cylinder B an ejected Cylinder C.

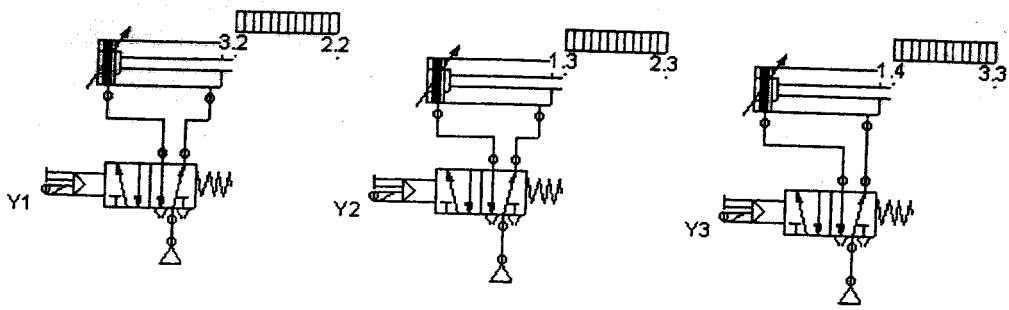
Positional sketch and arrangement of the cylinders:



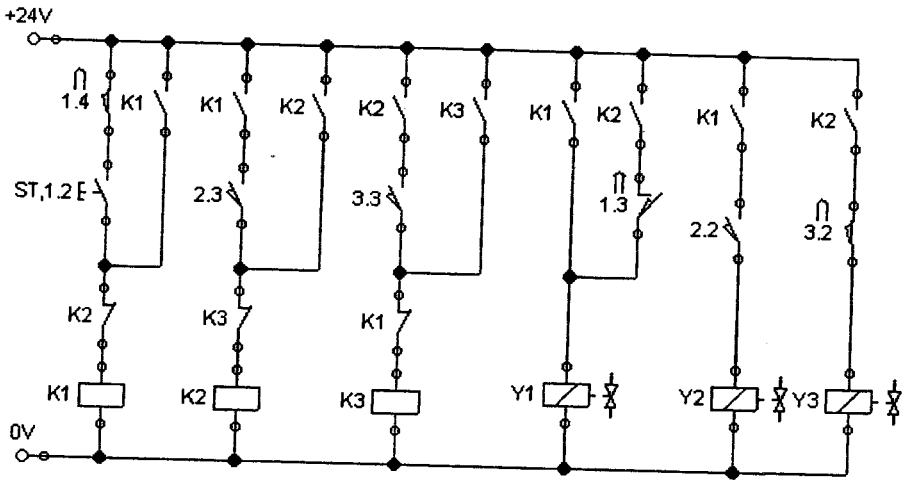
Displacement –step diagram



Power circuit



Control circuit

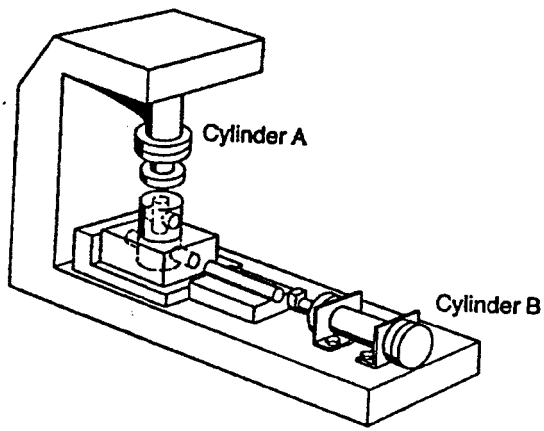


Example : Pressing fixture

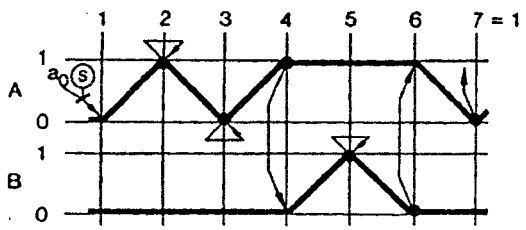
Problem

Parts are slowly pressed in on an assembly fixture. To attain the full depth of pressing, the press cylinder must operate a second time with a short impact and then hold the work piece until a second cylinder has pressed in a locking pin from the side. One magnetic and two inductive approximately switch must be used

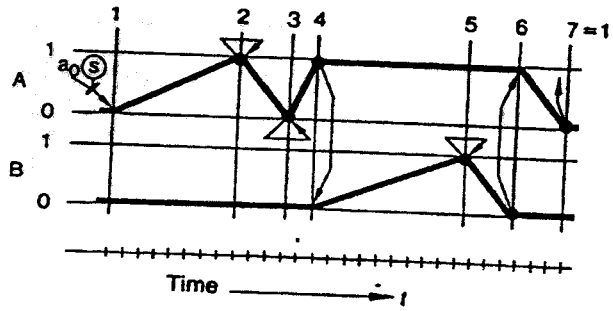
Positional sketch and arrangement of cylinders



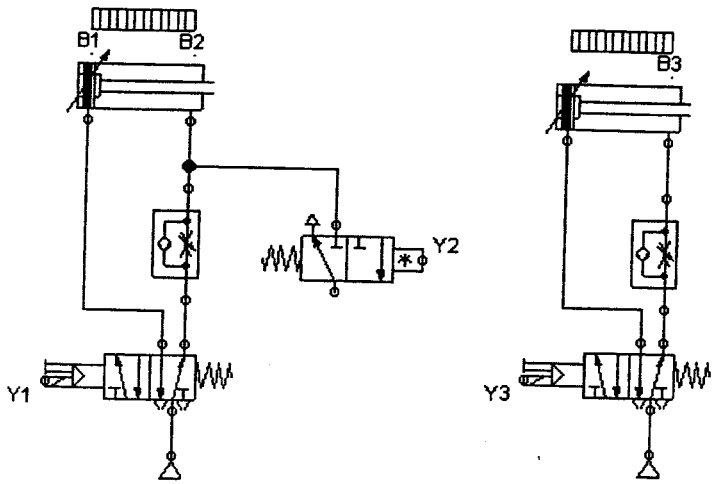
Displacement –step diagram



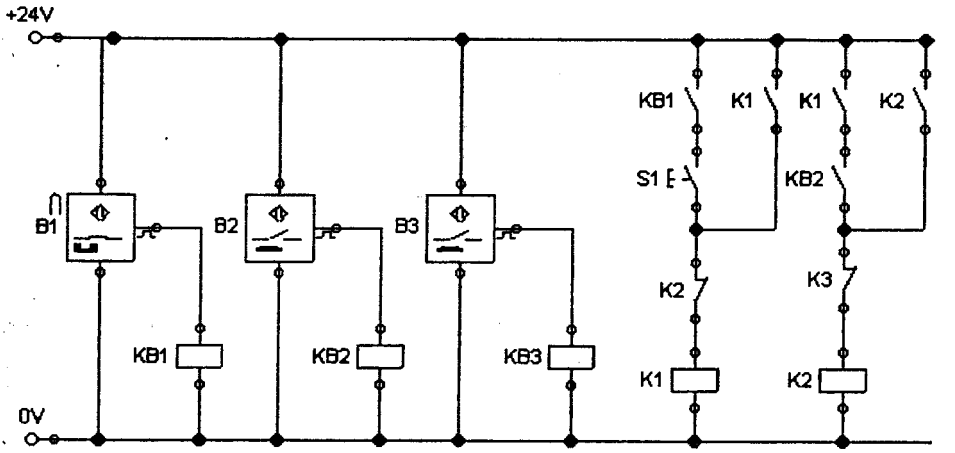
Displacement-time diagram

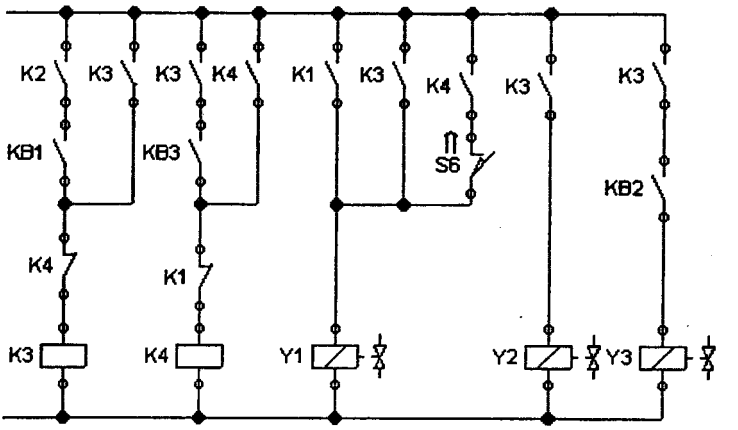


Power circuit



Control circuit

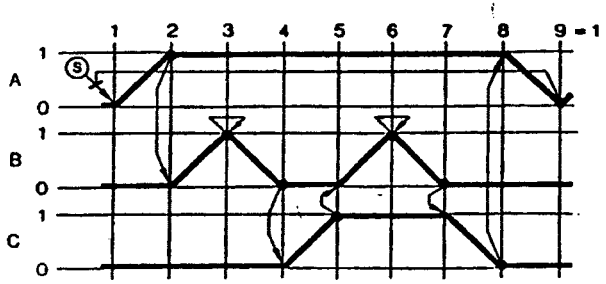




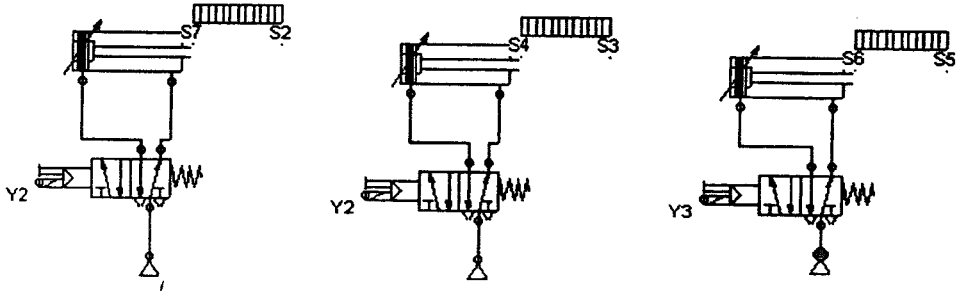
Example :Drilling Unit

A control is to be design for a special machine on which two equally sized holes are to be drilled close together in rectangular parts. The parts are taken from a gravity-feed magazine and pushed into the fixture against a fixed stop by a double acting cylinder A. The parts are held securely by the feed cylinder a during the machining operation. A pneumatic –hydraulic feed units B is used for the feed of the drilling spindle used in the machining operation. A feed table operating between fixed limits by two fixed stops in conjunction with a double –acting cylinder C is used for positioning the second hole. The parts are ejected by and ejector mechanism which is operated on the return motion of the feed cylinder.

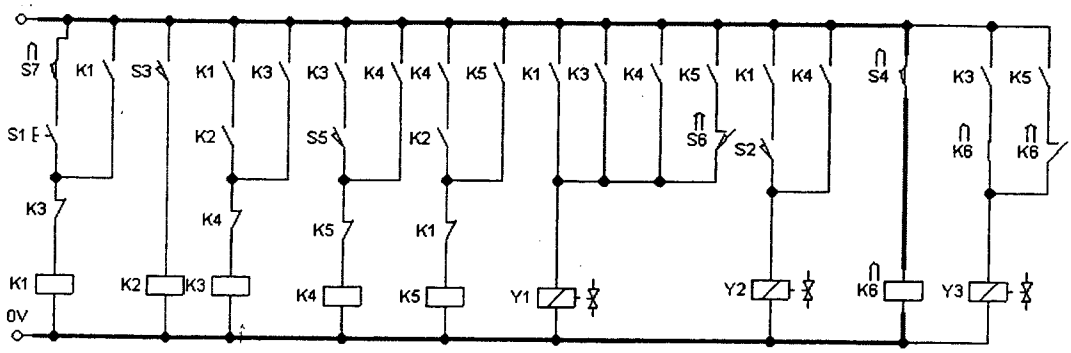
Displacement-step diagram



Power circuit



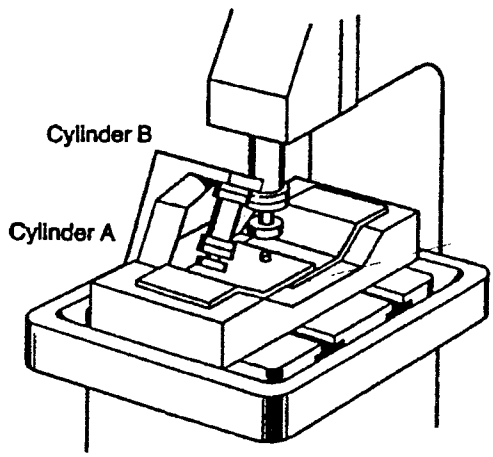
Control circuit



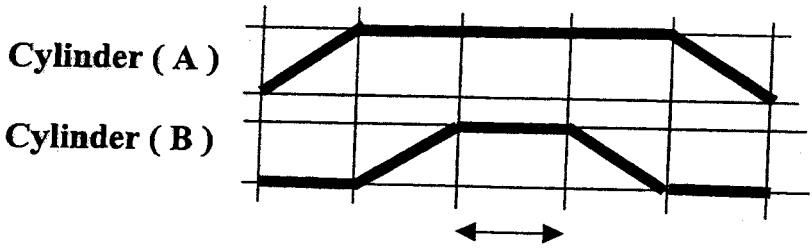
Time delay function in sequential circuit

Example :Riveter

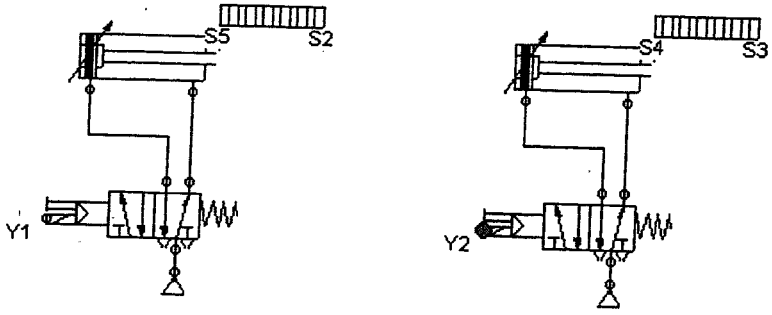
Positional sketch and determination of working elements:



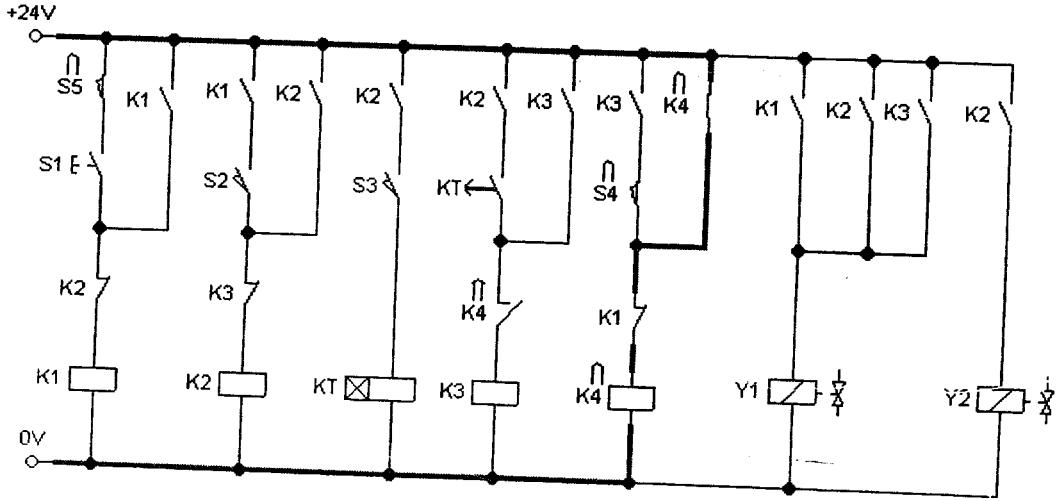
Displacement-step diagram



Power circuit



Control circuit



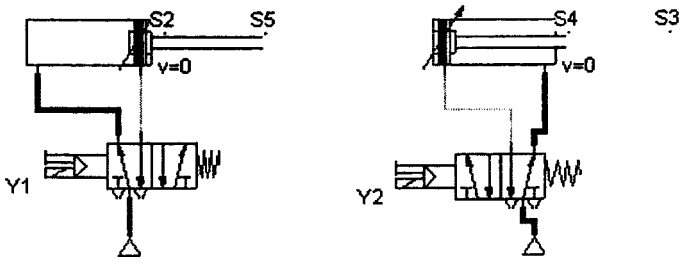
Counter function in sequential circuit

Reciprocating motion with predetermine count number

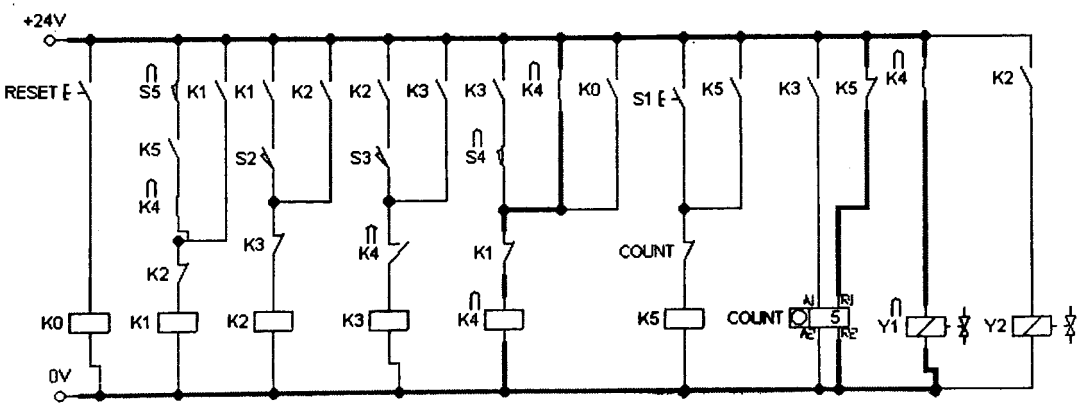
Abbreviated notation

A-B+B-A+,A-B+B-A+,A-B+B-A+,A-B+B-A+,A-B+B-A+,

Power circuit

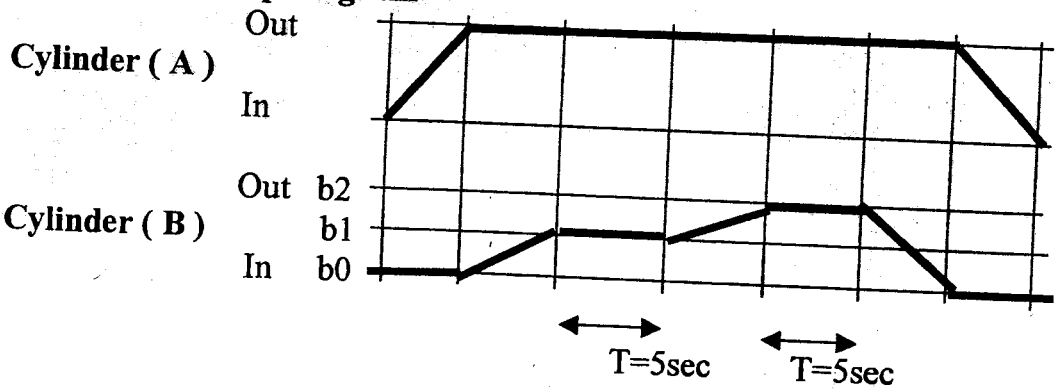


Control circuit

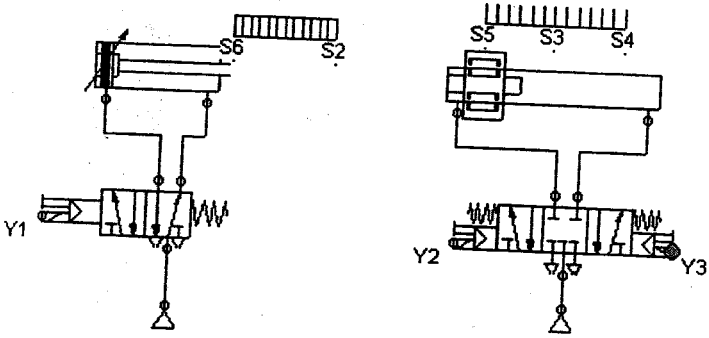


Intermediated stop and positioning in sequential circuit

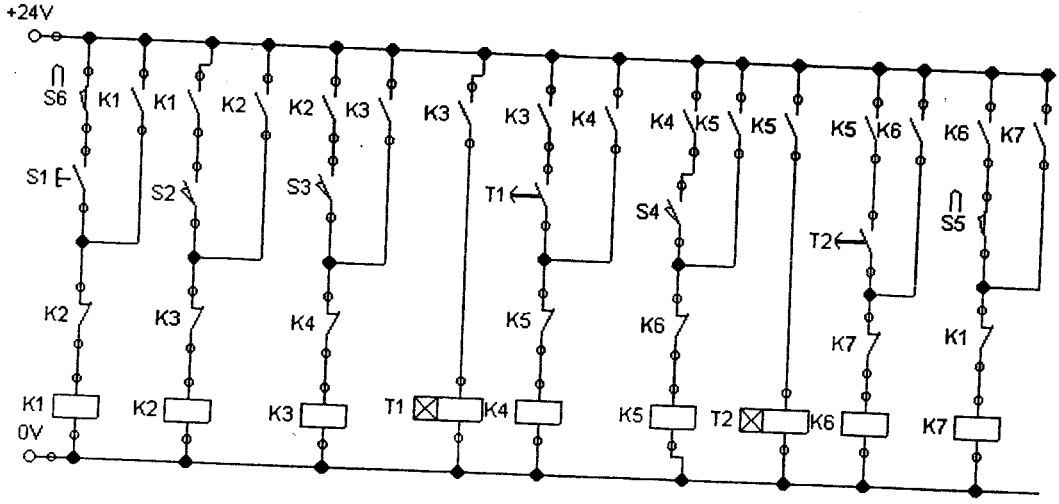
Displacement step diagram

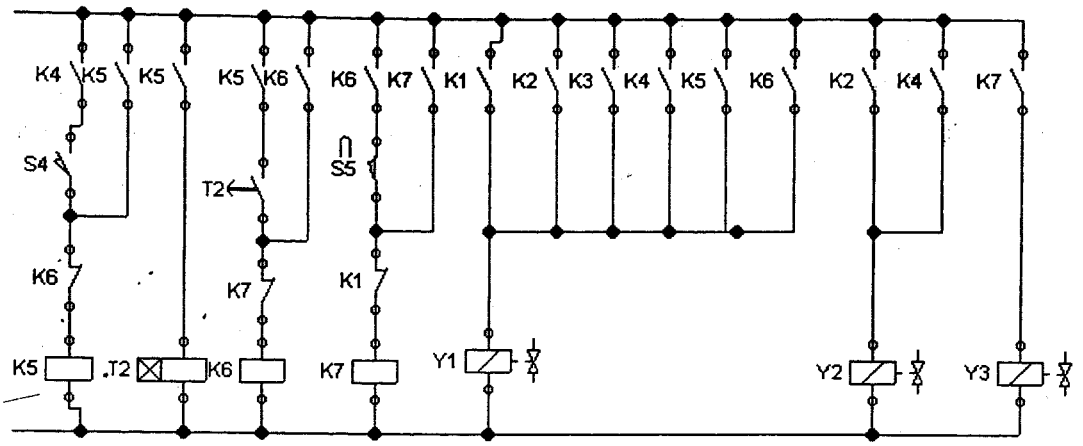


Power circuit



Control circuit




K4
K5
K5
K5
K6
K6
K7
K1
K2
K3
K4
K5
K6
K2
K4
K7
S4
T2
S5
K6
K7
K1
K5
T2
K6
K7
Y1
Y2
Y3